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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/596,706	04/03/2007	Jens-Christian Meiners	UOM0324PUSA	2884
22045 7590 07/29/2010 BROOKS KUSHMAN P.C. 1000 TOWN CENTER TWENTY-SECOND FLOOR SOUTHFIELD, MI 48075				
EXAMINER				
SOOHOO, TONY GLEN				
ART UNIT		PAPER NUMBER		
1797				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/596,706

**Applicant(s)**

MEINERS ET AL.

**Examiner**

Tony G. Soohoo

**Art Unit**

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/CD)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding method claim 1, and 3, are unclear in where the flow stream is recited concentration profile, and increased concentration gradient is being measured and at what point of the structure of the invention is this measurement.

Claim 1 is vague in physical meets and bound of a "folded over" concentration profile. A "concentration" is not a structural or physical element which would be easily identified as being "folded" in the traditional sense.

Claim 3 is unclear if the recited "increased exponentially" is an effect of a previously recited manipulative step (such as the previous steps of splitting, or recombining) , or if there is a positive manipulation of increasing the gradient by an external manipulation by a further unclaimed manipulation (such as adding more concentrated fluid to the flow)

Regarding apparatus claims 7-20, the independent claims 7 and point opponent out that the mixer includes a plurality of separate microfluidic channels which have a desired operative effect of "for splitting... rotating... recombining... to obtain [an effect, lie folded over .. and increased concentration gradient] ".

The mere provision of plural channels does not readily impart any structure which may be capable of splitting, rotating, and recombining” The claimed channel structure has not claimed any particular structure to permit and warrant the effect and functions recited in the claim, thereby appears to be structurally incomplete to perform the recited effects of operation. Analysis of the claims show that there is no positive recitation to a means plus function claim construction to the channel structure, (i.e. 35 USC 112, 6th paragraph has not been invoked.)

Regarding claim 9-10 and 12, 16, 17, and 19, these claims recite operative conditions of the fluid and the state of the fluid as it flows through apparatus (i.e. the claim points out details to the manner, state of operation, and state of effect upon the materials used in the mixer apparatus). Such limitation is not afforded any structural distinction in apparatus claim construction, thereby causes questions as to the difference in structural scope of these claims from that of the structure parent claim. Applicant is reminded. MATERIAL OR ARTICLE WORKED UPON DOES NOT LIMIT APPARATUS CLAIMS.

“Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim.” Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, “[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.” In re Young, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in In re Otto, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967).

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 7-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Schwesinger et al., USP 5904424.

The Schwesinger (et al) reference discloses: an apparatus having a channels 1, 2, 3, 4, 5,6,7,8 and placement of channels on a substrate 26 (fig2) to provide a mixing of fluid streams. The stream (for example fig 1a, or 1b) from 1 is; a] split into separate fluid streams (in fig 1a, the left portion L to channel 3, right portion R to channel 4), b] rotated relative to each other and the concentration profile is rotated ( rotated 90 degrees from another from the 2 channel to the 3 channel/ 4 channel, and rotated 90 degrees at the entry of 3 to 6 and 4 to 5, with a further rotation from the offset of 5 and 6 as it is converges to an offset at 7), c] recombining the separate fluid streams at 7, whereby the concentration profile is "folded over" whereby the left and right sides have been rotated and folded one above the other, and has an increased in concentration gradient from the discontinuity introduced by the combining of the flows from 5 and 6 (the concentration has a discontinuity which the gradient spikes. Also a

mathematician may write an exponential function to describe the spike of the gradient).

Note that the flows are rotated to the left and to the right, thereby the flow streams are rotated in opposite directions. Additionally, the flows are vertically offset. The splitting and offset provides a "helical fashion" rotation of the streams.

Figure 1a and 1b shows square cross-section channels.

Note that the manner of mixing caused by the channels such as issues to diffusion mixing and mixed at certain Reynolds numbers are all dependent upon the operational factors of the fluids, and its flow rates during the use of the channel. Such issues would not structural change the channel structures itself, and thus directed to the material worked upon by the channel and the manner operation (type of fluid, fluid flow velocity) of the fluids used in the channels. Manner of operation and the material worked upon by an apparatus does not patentably distinguishes the instant claims from the prior art channels.

#### **5. *Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being anticipated by Schwesinger et al., USP 5904424.

The Schwesinger (et al) reference discloses: an apparatus and its corresponding method of mixing fluid streams. The stream (for example fig 1a, or 1b) from 1 is; a] split into separate fluid streams (in fig 1a, the left portion L to channel 3, right portion R to channel 4), b] rotated relative to each other and the concentration profile is rotated ( rotated 90 degrees from another from the 2 channel to the 3 channel/ 4 channel, and rotated 90 degrees at the entry of 3 to 6 and 4 to 5, with a further rotation from the offset of 5 and 6 as it converges to an offset at 7), c] recombining the separate fluid streams at 7, whereby the concentration profile is "folded over" whereby the left and right sides have been rotated and folded one above the other, and has an increased in concentration gradient from the discontinuity introduced by the combining of the flows from 5 and 6 (the concentration has a discontinuity which the gradient spikes. Also a mathematician may write an exponential function to describe the spike of the gradient). Note that the flows are rotated to the left and to the right, thereby the flow streams are rotated in opposite directions. Additionally, the flows are vertically offset. The splitting and offset provides a "helical fashion" rotation of the streams.

The Schwesinger reference discloses the method of flowing the streams in a helical fashion, at least once in figure 1a, or 1b.

In light of the teaching flowing streams by splitting and rotating in a generally helical fashion to work the fluid for mixing at least once, (see also Schwesinger claim construction "at least one"), it would have been obvious to duplicate such an structure and its successive of mixing operations until the mixture is fully mixed. It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

It is noted that in all interaction between fluids there is a diffusion interaction component (diffusion mixing) between the fluids to some extent.

Regarding the certain Reynolds numbers of operation being between 0.1 and 2, It is noted that Reynolds numbers are all dependent upon the operational factors of the fluids (such as flow velocity, viscosity, temperature), during the use the fluids of the channel. The Schwesinger reference is a micromixer which would inherently have low volume flow rates and fluids which would exhibit such a Reynolds numbers in the flow channels. Nonetheless, it would have been obvious to one of ordinary skill in the art of fluid mechanics and material science to chose an appropriate set of fluids when flowed through the channel for mixing which would exhibit the Reynolds numbers between 0.1 and 2 so that those chosen set of fluids may be better mixed.

**Conclusion**

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nielsen et al 6190034, Heusser et al 6599008, Tollar 3239197, and Kabatek et al 4874249.
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony G. Soohoo whose telephone number is (571) 272 1147. The examiner can normally be reached on 8AM-5PM, Tues-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/  
Primary Examiner, Art Unit 1797

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